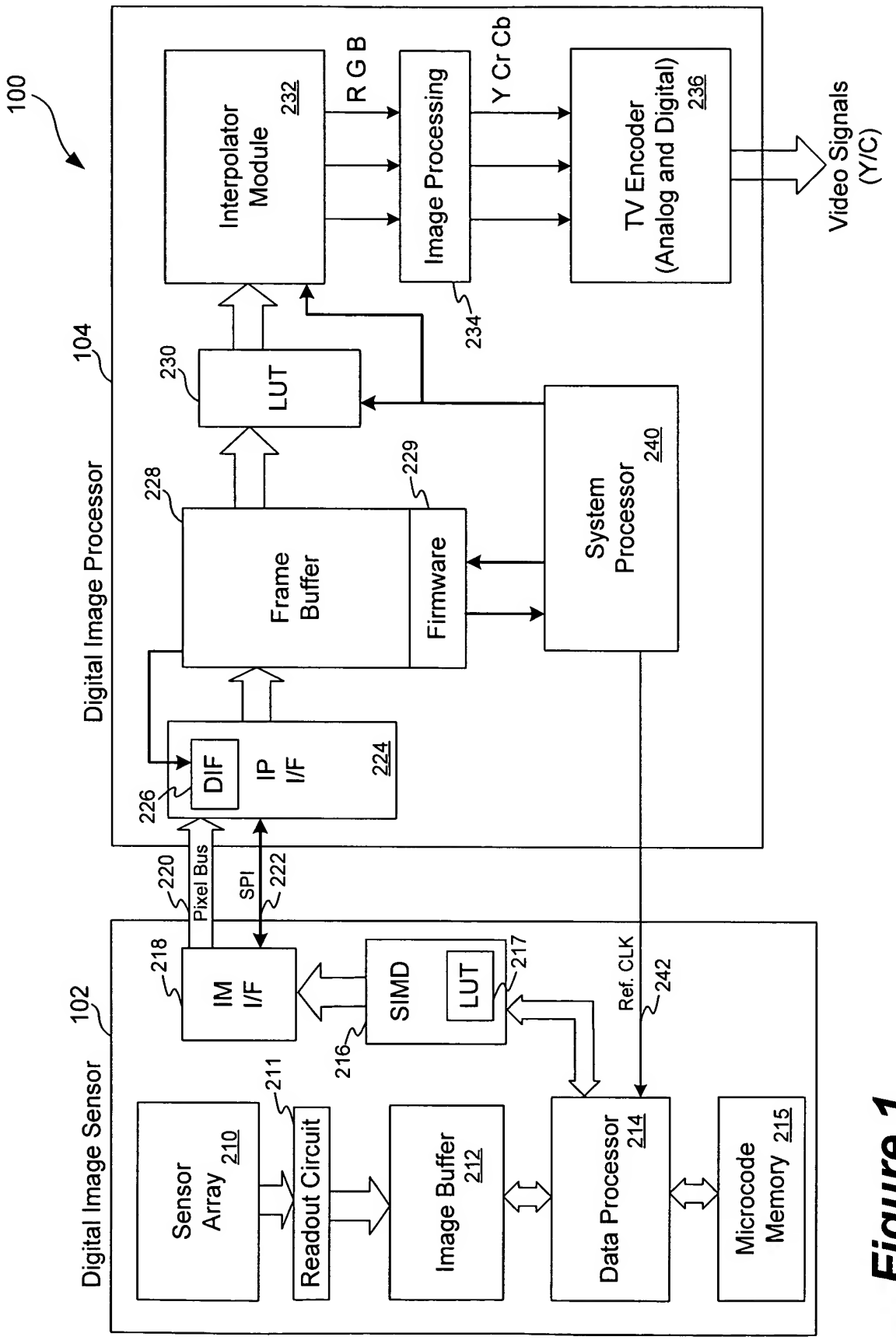
100
Digital Image Processor
104
Digital Image Sensor
102
Interpolator Module
232
R G B
Image Processing
234
Y Cr Cb
TV Encoder (Analog and Digital)
236
Video Signals (Y/C)
LUT
230
Frame Buffer
228
Firmware
229
System Processor
240
DIF
IP I/F
224
226
Pixel Bus
220
SPI
222
IM I/F
218
SIMD
LUT
217
216
Ref. CLK
242
Sensor Array
210
Readout Circuit
211
Image Buffer
212
Data Processor
214
Microcode Memory
215

Figure 1

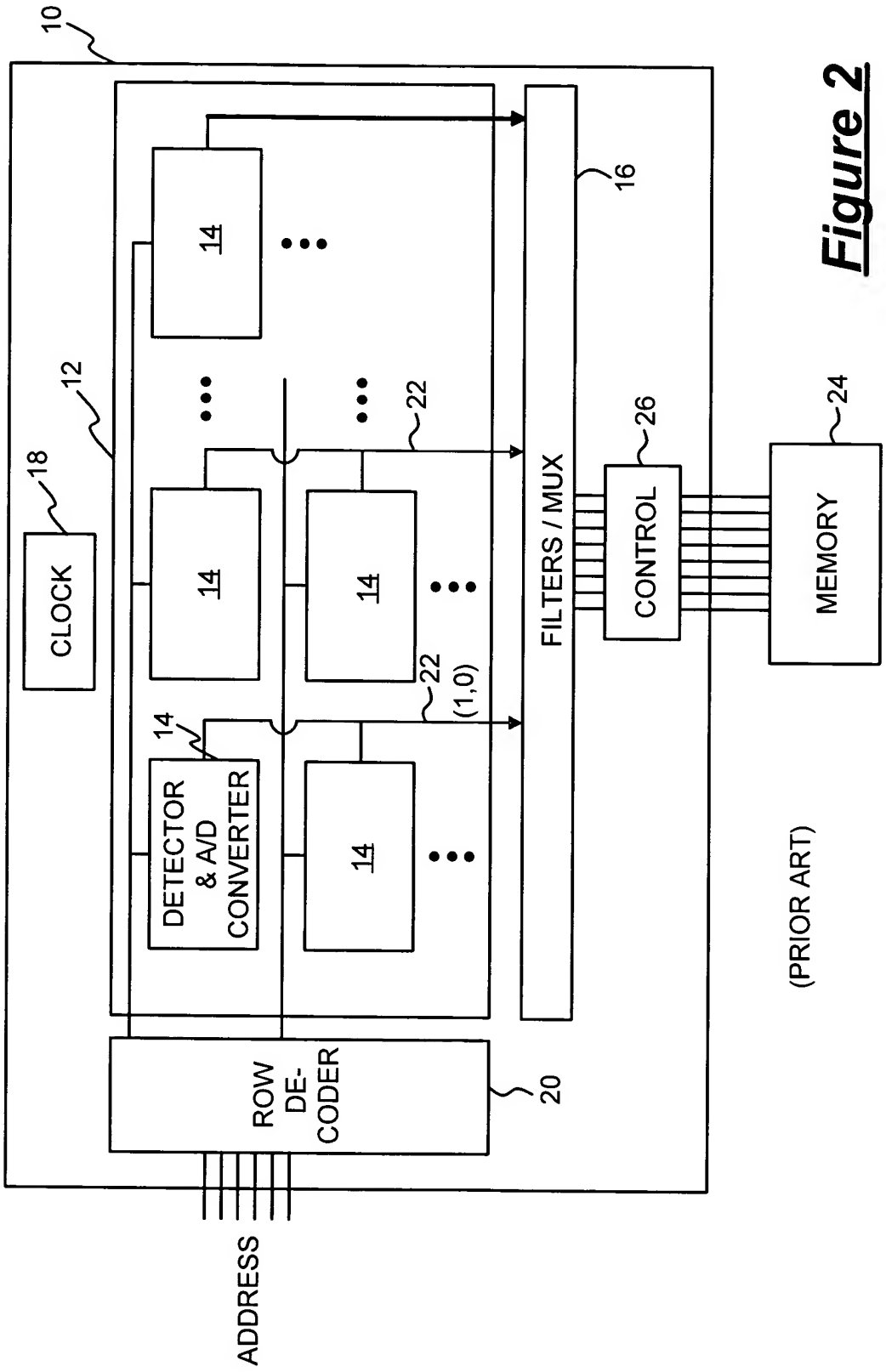

Figure 2

(PRIOR ART)

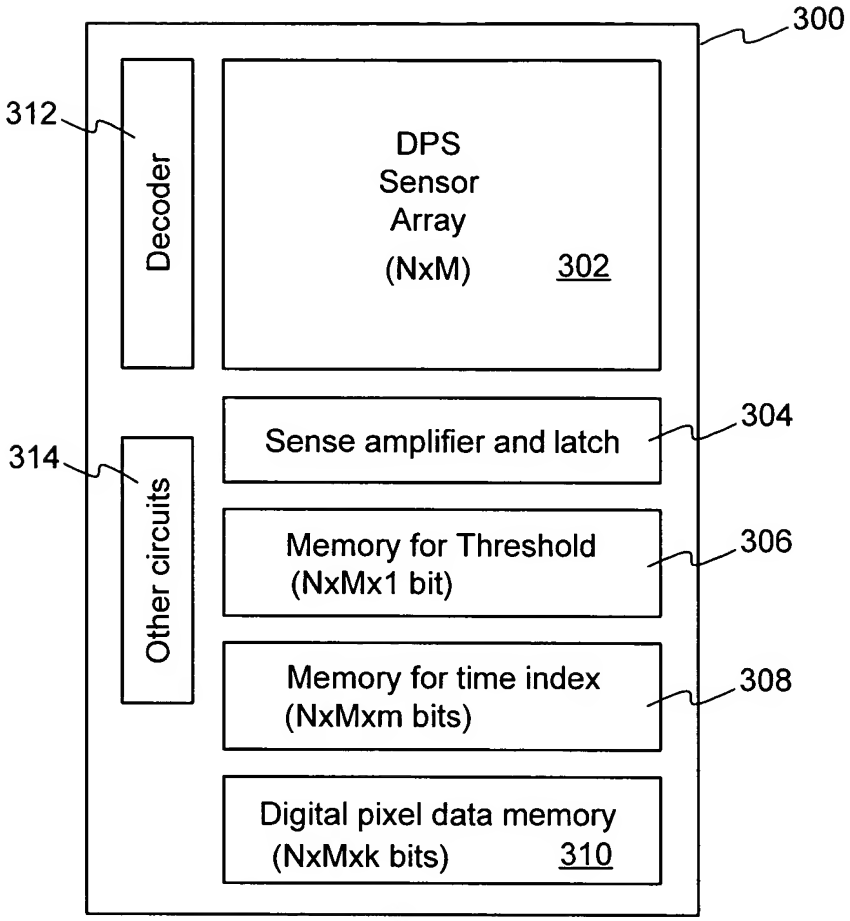
300
312
Decoder
DPS
Sensor
Array
(NxM) 302
314
Other circuits
Sense amplifier and latch
304
Memory for Threshold
(NxMx1 bit)
306
Memory for time index
(NxMxm bits)
308
Digital pixel data memory
(NxMxk bits) 310

Figure 3

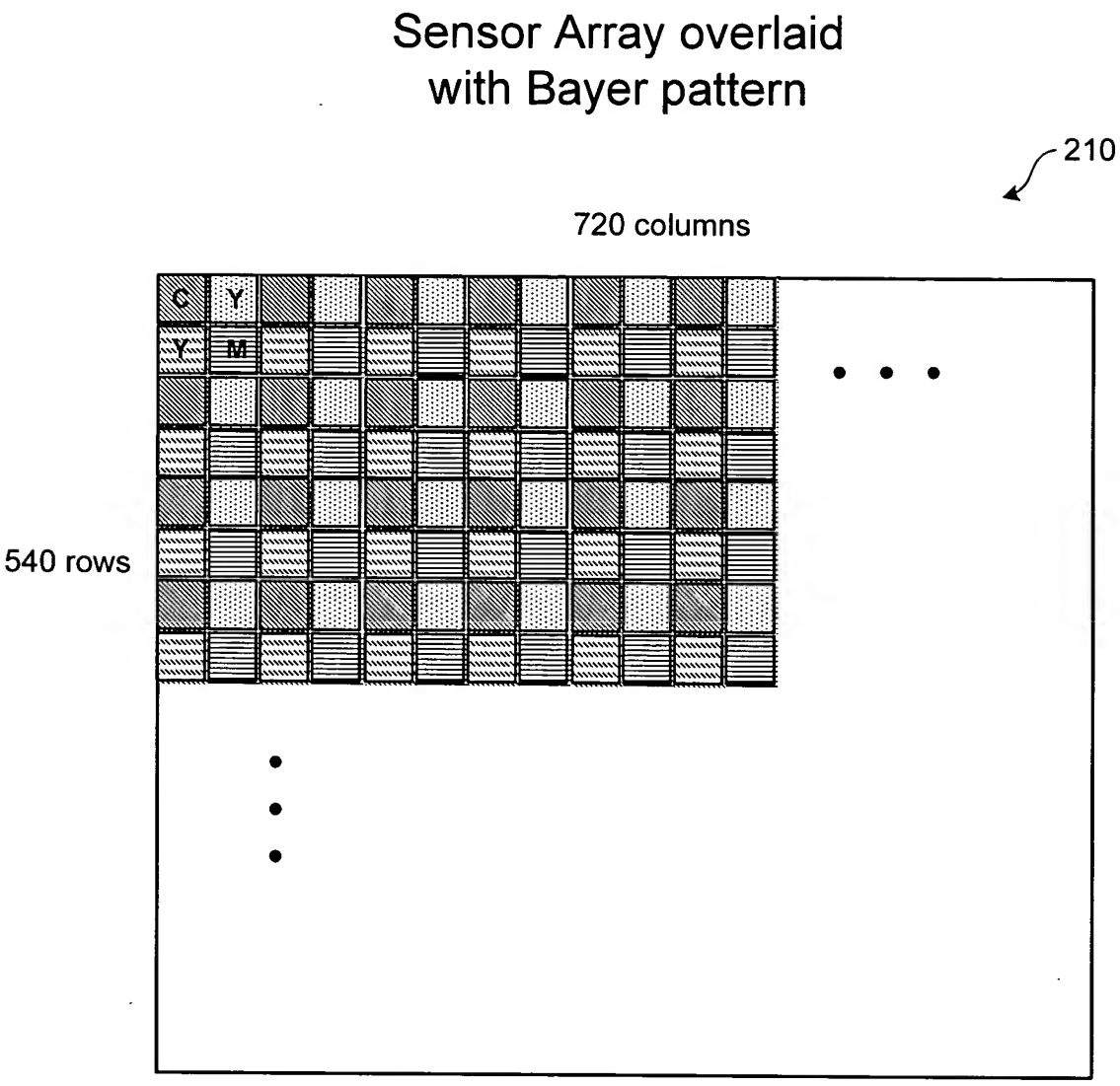
Sensor Array overlaid
with Bayer pattern
210
720 columns
540 rows
C
Y
Y
M

Figure 4

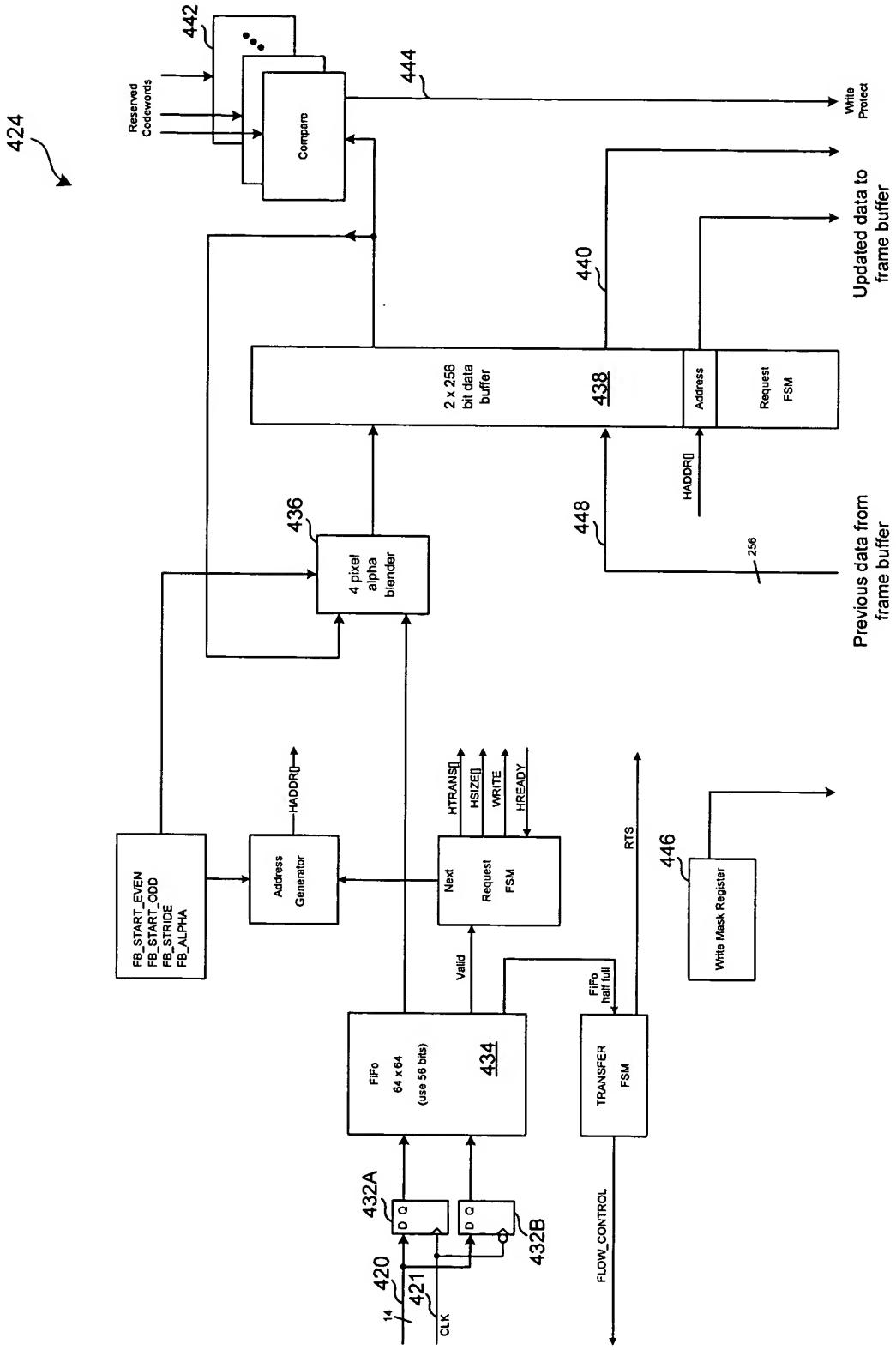
424
442
Reserved Codewords
Compare
444
Write Protect
Updated data to frame buffer
440
2 x 256 bit data buffer
438
Address
Request FSM
HADDR[]
448
256
Previous data from frame buffer
436
4 pixel alpha blender
FB_START_EVEN
FB_START_ODD
FB_STRIDE
FB_ALPHA
Address Generator
HADDR[]
HTRANS[]
HSIZE[]
WRITE
HREADY
Next Request FSM
RTS
446
Write Mask Register
Valid
FIFo half full
FIFo 64 x 64 (use 58 bits)
434
TRANSFER FSM
432A
432B
D Q
420
421
14
CLK
FLOW_CONTROL

Figure 5

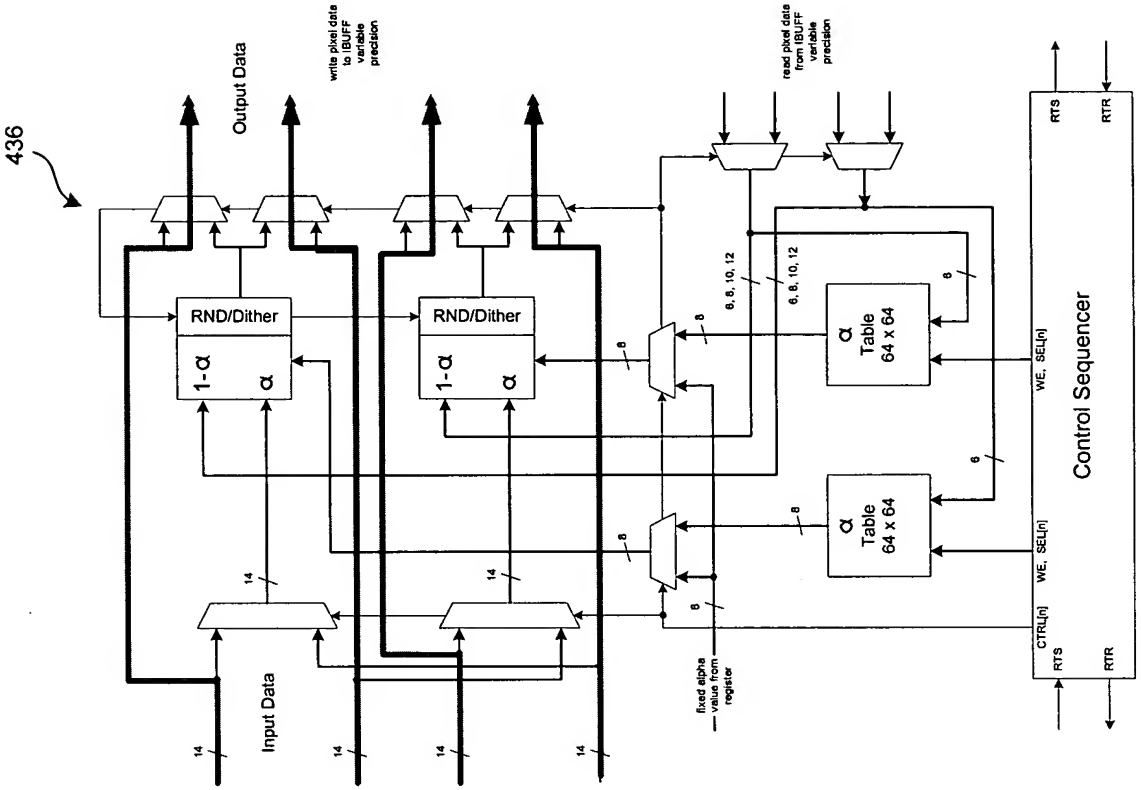

Figure 7

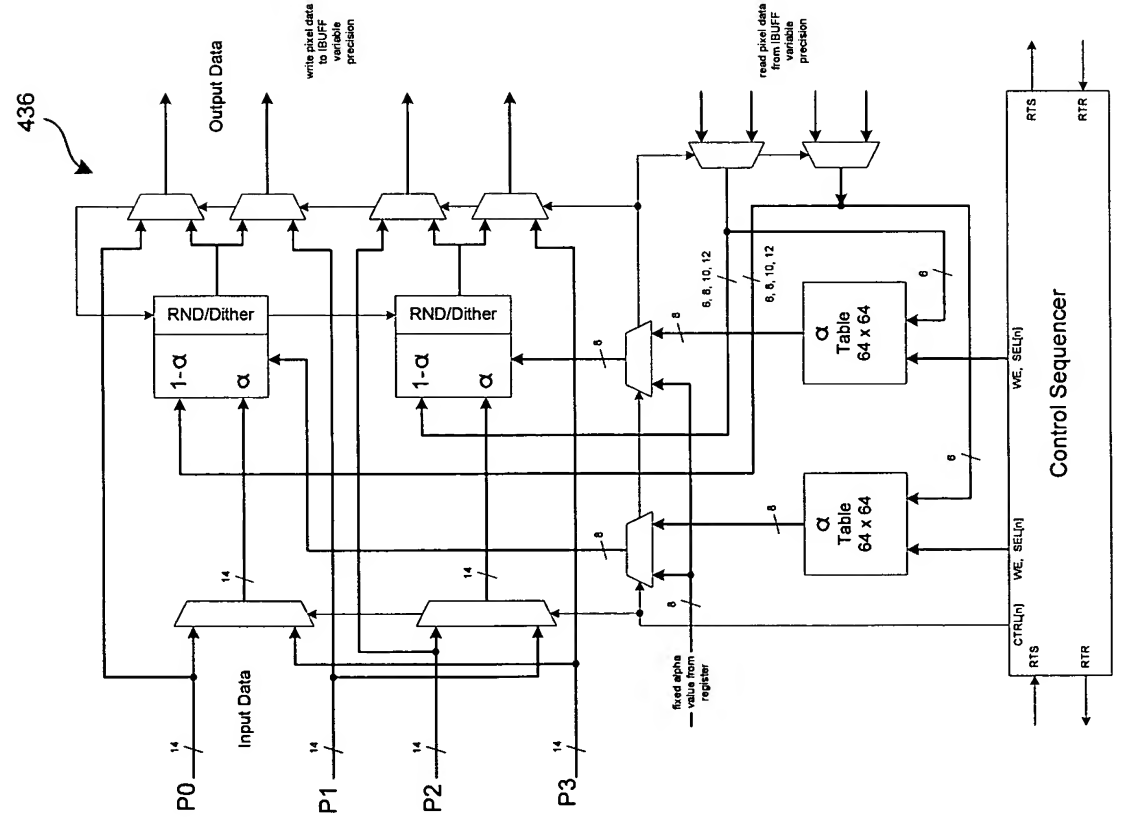

Figure 6

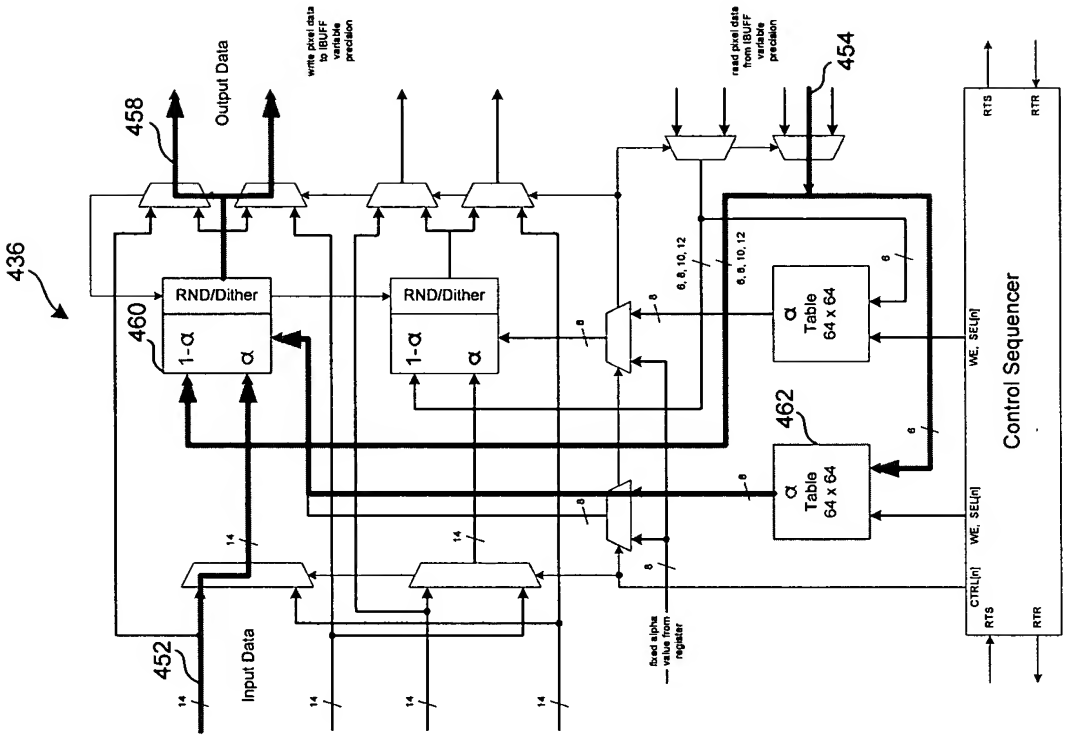

Figure 9

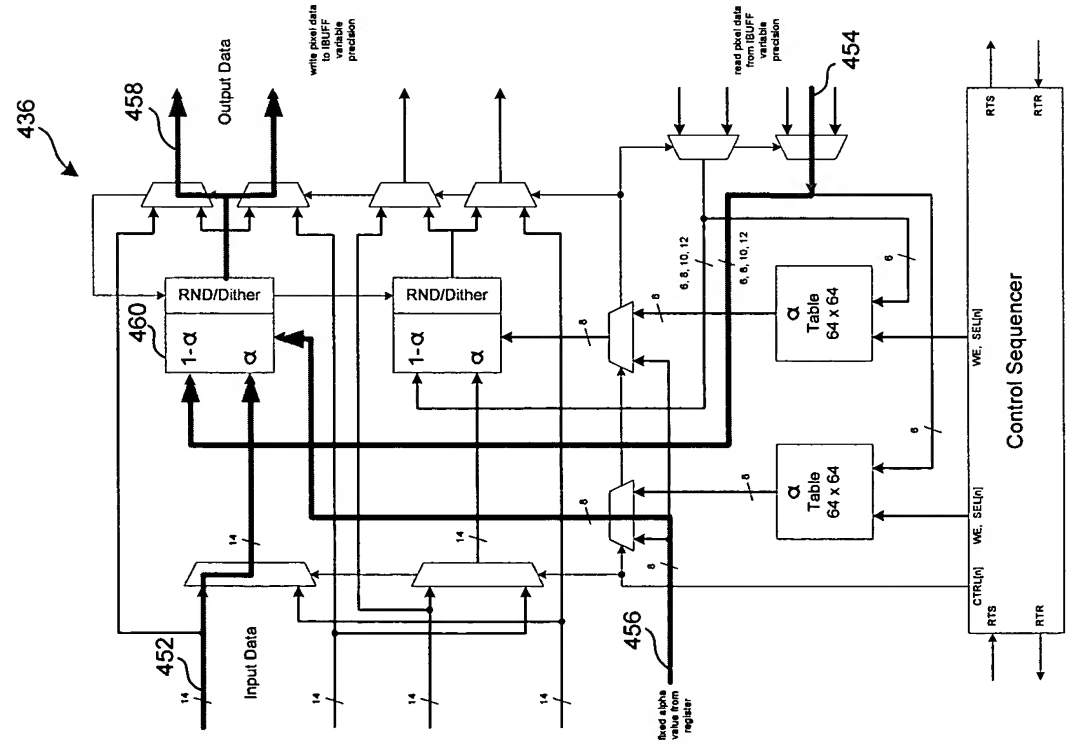

Figure 8

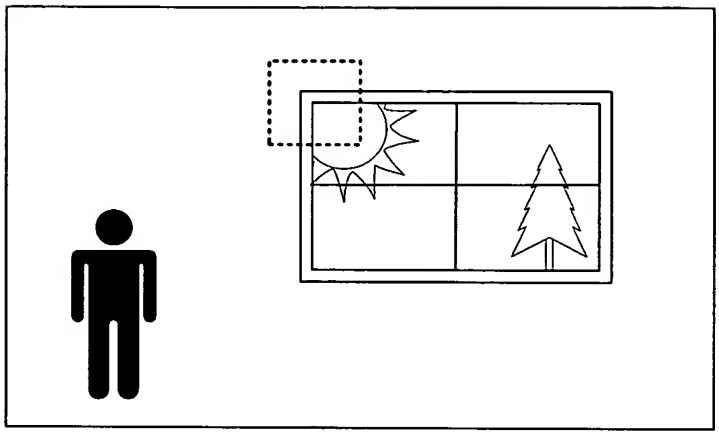

Figure 10

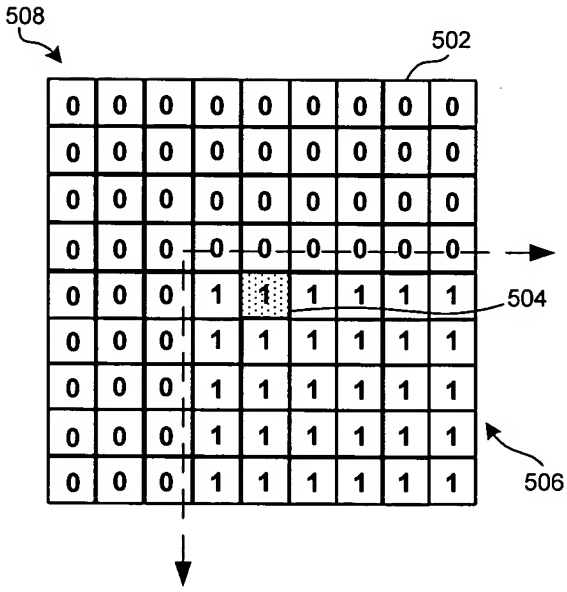

Figure 13

Blending Mask

510

.2	.2	.2	.2	.2	.2	.2	.2	.2
.2	1	1	1	1	1	1	1	.2
.2	1	2	2	2	2	2	1	.2
.2	1	2	4	4	4	2	1	.2
.2	1	2	4	8	4	2	1	.2
.2	1	2	4	4	4	2	1	.2
.2	1	2	2	2	2	2	1	.2
.2	1	1	1	1	1	1	1	.2
.2	.2	.2	.2	.2	.2	.2	.2	.2

Figure 14

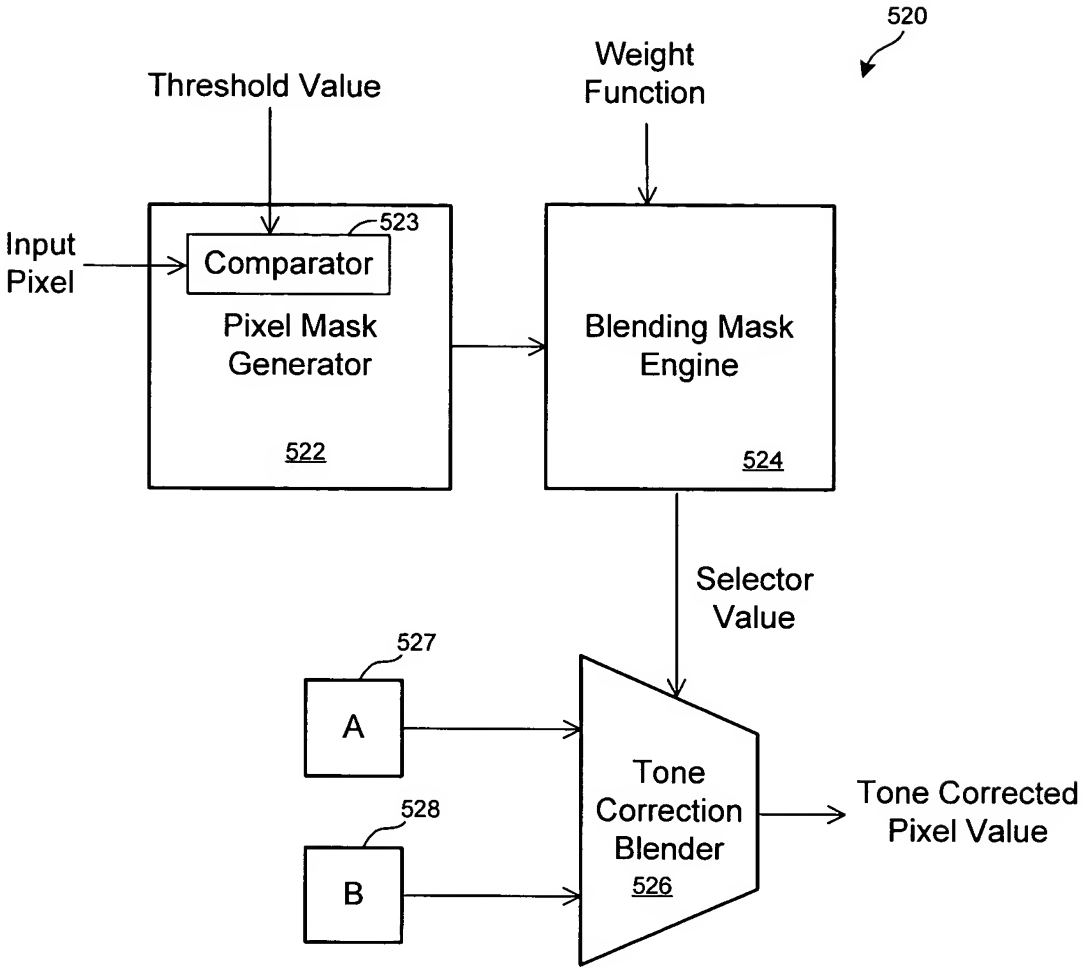
520
Weight Function
Threshold Value
Input Pixel
523
Comparator
Pixel Mask Generator
522
Blending Mask Engine
524
Selector Value
527
A
528
B
Tone Correction Blender
526
Tone Corrected Pixel Value

Figure 11

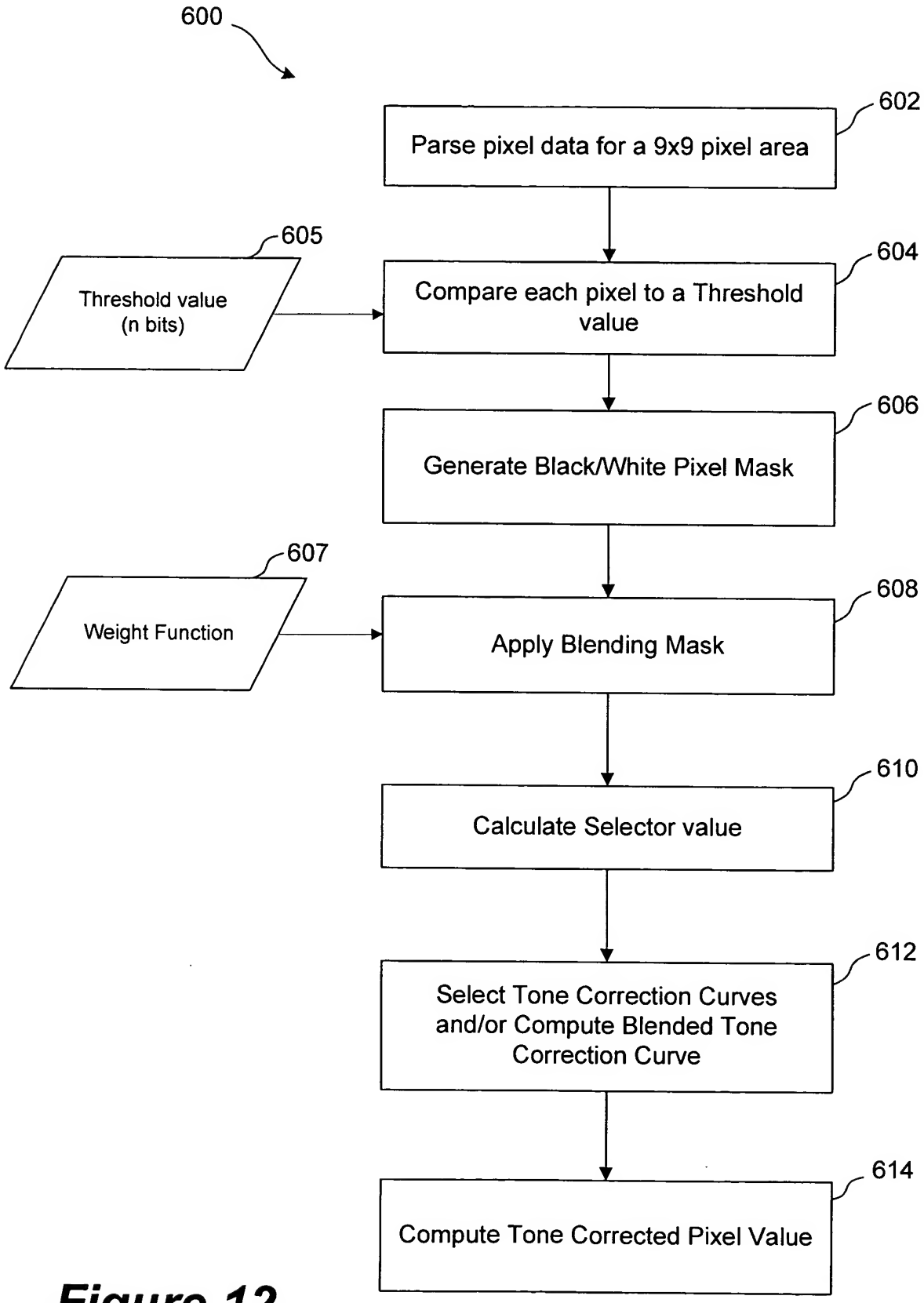
600
602
Parse pixel data for a 9x9 pixel area
605
Threshold value
(n bits)
604
Compare each pixel to a Threshold value
606
Generate Black/White Pixel Mask
607
Weight Function
608
Apply Blending Mask
610
Calculate Selector value
612
Select Tone Correction Curves and/or Compute Blended Tone Correction Curve
614
Compute Tone Corrected Pixel Value

Figure 12